

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

ORDER NO. R5-2006-0110
WASTE DISCHARGE REQUIREMENTS
FOR
ALPHA DYNO NOBEL dba ALPHA EXPLOSIVES
AND HERCULES INCORPORATED

INSITU GROUNDWATER TREATMENT SYSTEM
PLACER COUNTY

The California Regional Water Quality Control Board, Central Valley Region, (hereafter Regional Water Board) finds that:

Alpha Explosives and Hercules Incorporated (Discharger) submitted a Report of Waste Discharge contained within an April 2006 *Remedial Action Work Plan* prepared by Hydrometrics, Inc. In the Remedial Action Work Plan, the Discharger proposes to inject acetate into groundwater to induce microbial degradation of perchlorate and nitrate insitu. The proposed injections will occur in at least one and up to three phases. The Alpha Explosives facility encompasses 23 acres at 3400 Nader Road (Site), about five miles northwest of Lincoln. The site location is illustrated on Attachment A.

The site of the first two phases of injections is on Assessor's Parcel Numbers (APN) 20-150-41 and -43, (latitude 38° 53' 43"N, longitude 121° 20' 25") as shown on Attachment B, and the location of the third phase of injections would be on adjacent property owned by Teichert Aggregates, APN 20-150-40, as shown on Attachment C, which are attached hereto and made part of these Waste Discharge Requirements, hereafter referred to as Order, by reference.

BACKGROUND

1. Hercules Incorporated conducted research and development of pourable perchlorate slurries and manufactured ANFO, a mixture of ammonium nitrate and fuel oil, at the Site between 1964 and 1971, when Hercules Incorporated terminated its lease. Beginning in 1966, Alpha Explosives subleased a small portion of the Site and distributed the ANFO to retail customers. Since 1971, Alpha Explosives has been manufacturing ANFO and distributing pre-packaged explosives. In 1999, Alpha Explosives purchased the property.
2. In 1996, Alpha Explosives installed monitoring wells to investigate the extent of nitrate pollution in groundwater, and in December 1997, perchlorate was discovered in the monitoring wells. Since then, numerous groundwater and soil investigations, and an extensive monitoring well network has delineated the extent of nitrate and perchlorate in soil and groundwater. The perchlorate plume extends westward about 3,000 feet off-site, and the nitrate plume is predominately onsite.

3. Groundwater is encountered about 15 to 20 feet below ground surface and the direction of groundwater flow is west to northwesterly. The perchlorate plume extends westerly from the Site.
4. An on-site industrial supply well contains about 90 ug/l perchlorate. An agricultural supply well situated about 900 feet west of the perchlorate plume terminus does not contain perchlorate, and this well is sampled annually for perchlorate.
5. The primary source area for perchlorate is a former evaporation pond on the north side of the mix building, and the mix building is identified as the origin of the nitrate in soil and groundwater. Soil investigations indicate that perchlorate is no longer a significant soil contaminant.
6. In 2006, perchlorate concentrations in groundwater monitoring wells ranged from less than 4 ug/L to a maximum of 35,000 ug/L near the former evaporation pond, and nitrate (as nitrogen) concentrations range from 2 mg/L to a maximum of 1,700 mg/L near the mix building. Over the past several years, perchlorate concentrations have been declining in downgradient monitoring wells, while the extent of the nitrate plume has been fairly stable.
7. Alpha Explosives and Hercules Incorporated have completed four insitu pilot studies and are currently conducting a fifth study (referred to as the Powerprobe Injection) evaluating the efficacy of acetate and ethanol carbon sources and various carbon delivery systems to stimulate indigenous microbes to degrade perchlorate and nitrate in groundwater insitu.
8. Within the treatment zone, which is characterized by an increase in total organic carbon, the acetate provides an easily degraded carbon source. Indigenous microbes in groundwater metabolize the carbon, and in turn transfer electrons onto various compounds, reducing them. If oxygen is available, it is the first compound to be reduced. When oxygen is consumed, conditions become anaerobic and then the microbes reduce nitrate and perchlorate, converting them ultimately to dinitrogen gas and chloride. The zone of anaerobic activity can also temporarily elevate concentrations of manganese and possibly ammonium.
9. The pilot studies have demonstrated the following:
 - Either acetate or ethanol is capable of stimulating biodegradation of perchlorate and nitrate in situ.
 - The extent of the treatment zone of a single injection location depends on aquifer characteristics. In impermeable formations, the radius of the treatment zone is limited to about 10-20 feet from the single injection location. The treatment zone is likely to be larger in more permeable formations and with multiple injection locations.
 - Ethanol and acetate are reduced by 90 to 99% of initial concentrations within three months of injection, at the injection locations.

- Fermentation and production of ammonium can be avoided by limiting carbon addition so as to not exceed the oxidative demand of the immediate injection area.
- Borehole injection can be accomplished at this site with either direct push equipment or with an auger drill.

PROPOSED REMEDIATION

10. Alpha Explosives and Hercules Incorporated propose to conduct field-scale in situ biological remediation of nitrate and perchlorate by injecting sodium acetate and trisodium trimetaphosphate into the groundwater. Phosphate is a macronutrient required by microorganisms for metabolism. The initial injection will occur through multiple injection locations arranged in a grid pattern. Several of the injection locations will be converted to temporary injection ports for supplemental carbon injections, which may occur as needed after the initial carbon is consumed. The remediation will occur in at least one and up to three distinct phases, separated by at least one year between phases. Phase I includes injection grids at the evaporation pond and the east and south sides of the mix building. Phase II would be a bio-barrier oriented transverse to the plume axis parallel to the western property boundary, and Phase III would be a similar bio-barrier west of and parallel to Phase II, adjacent to Nader Road, as conceptually illustrated on Attachments B and C.
11. In Phase I, an injection grid covers the former evaporation pond area with about 32 injection locations, and another grid covers the east and southeast boundaries of the mix building with about 26 injection locations. The acetate and phosphate will be diluted with groundwater obtained from monitoring wells near the evaporation pond and near the mix building. A new monitoring well (MW-18) will be installed downgradient of the mix building, near the northwest corner. This well and existing monitoring wells are downgradient of both of these injection grids and will serve as the performance monitoring network for assessing remediation progress.
12. Prior to initiating Phase II and Phase III injections, Alpha Explosives and Hercules Incorporated will provide a work plan for Regional Water Board staff review, comment and concurrence, consistent with the framework outlined in this Order and based on results achieved during Phase I.
13. Extrapolating the results of the single-injection pilot studies to a grid-injection arrangement, the treatment zone is expected to extend up to 30-50 feet from the injection locations and return to baseline conditions within two-to-four years after the final injection. The distance and timing will depend in part on the aquifer permeability where the carbon is injected.

REGULATORY CONSIDERATIONS

14. The injection of chemicals into waters of the State is subject to regulation under the California Water Code. This Order authorizes Alpha Explosives and Hercules Incorporated to discharge sodium acetate, phosphate, and reinject groundwater as needed for dilution, into groundwater subject to specific discharge requirements.
15. The *Water Quality Control Plan for the Sacramento River and San Joaquin River Basins, Fourth Edition* (hereafter Basin Plan) designates beneficial uses, establishes water quality objectives (WQOs), contains implementation plans and policies for protecting waters of the basin, and incorporates by reference plans and policies adopted by the State Water Resources Control Board (State Water Board). Pursuant to Section 13263(a) of the California Water Code, Waste Discharge Requirements must implement the Basin Plan.
16. Surrounding land uses are agricultural.
17. Surface water drainage is to Coon Creek, a perennial stream that ultimately flows to the Sacramento River. The beneficial uses of the Sacramento River are municipal and domestic supply; agricultural irrigation and stock watering supply; process and service industrial supply; contact recreation; other noncontact recreation; warm and cold freshwater habitat; warm and cold migration; warm water spawning; wildlife habitat; and navigation.
18. The designated beneficial uses of underlying groundwater are municipal and domestic supply, agricultural supply, and industrial service and process supply.
19. State Water Board Resolution No. 92-49 (hereafter Resolution No. 92-49) requires the Regional Water Board to require actions for cleanup and abatement of discharges that cause or threaten to cause pollution or nuisance to conform to the provisions of State Water Board Resolution No. 68-16 (hereafter Resolution No. 68-16) and the Basin Plan. Pursuant to Resolution No. 92-49, the Regional Water Board shall ensure that dischargers are required to clean up and abate the effects of discharges in a manner that promotes attainment of either background water quality, or if background levels of water quality cannot be restored, the best water quality which is reasonable and which complies with the Basin Plan including applicable Water Quality Objectives.
20. Resolution No. 68-16 requires the State Water Board in regulating discharges to maintain high quality waters of the state until it is demonstrated that any change in quality will be consistent with maximum benefit to the people of the State, will not unreasonably affect present and potential beneficial uses, and will not result in water quality less than that described in plans and policies (e.g., quality that exceeds Water Quality Objectives). Temporal degradation of groundwater may occur at this site due to the amended groundwater injection. The temporary degradation allowed by this Order is consistent with Resolution No. 68-16 since (1) the purpose is to accelerate and enhance remediation of groundwater pollution and such remediation will benefit the people of the state; (2) the discharge facilitates a project to evaluate the effectiveness of cleanup technology in accord with Resolution No. 92-49; (3) the degradation is limited in scope and duration; (4) best

practicable treatment and control, including adequate monitoring to assure protection of water quality, are required; and (5) the discharge will not cause Water Quality Objectives to be exceeded beyond the treatment zone or project duration, as described in Finding No. 13.

21. As described in the Basin Plan, groundwater cleanup goals range between background concentrations to the Water Quality Objectives (WQO), unless background for naturally occurring constituents is higher than the WQO, in which case the cleanup goals are the background concentrations. For this site, the background concentrations for perchlorate and ammonium are the detection limit, since these compounds are not known to be present upgradient of the Site. The background concentration for nitrate-nitrogen is less than 7 mg/l, as identified in monitoring wells MW-1 and MW-14, located outside of the nitrate plume. For WQOs that are not maximum contaminant levels, the WQO is the narrative toxicity objective. Numerical limits cited here implement the objective. The following are the WQOs for the site contaminants:

Constituent	Water Quality Objective	Reference
Perchlorate	6 µg/l	California Public Health Goal
Nitrate-nitrogen	10 mg/l	California Primary Maximum Contaminant Level
Ammonium	1.5 mg/l	Odor threshold (Amoore and Hautala)

22. Section 13267(b) of California Water Code provides that:

In conducting an investigation specified in subdivision (a), the Regional Water Board may require that any person who has discharged, discharges, or is suspected of having discharged or discharging, or who proposes to discharge within its region, or any citizen or domiciliary, or political agency or entity of this state who has discharged, discharges, or is suspected of having discharged or discharging, or who proposes to discharge waste outside of its region that could affect the quality of the waters of the state within its region shall furnish, under penalty of perjury, technical or monitoring program reports which the board requires. The burden, including costs of these reports, shall bear a reasonable relationship to the need for the reports and the benefits to be obtained from the reports. In requiring those reports, the Regional Water Board shall provide the person with a written explanation with regard to the need for the reports, and shall identify the evidence that supports requiring that person to provide the reports.

The technical reports required by this Order and the attached MRP No. R5-2006-0110 are necessary to assure compliance with these Waste Discharge Requirements. Alpha Explosives owns the property and Hercules Incorporated operated the facility that discharged the waste subject to this Order.

23. Issuance of this Order is an action to assure the restoration of the environment and is, therefore, exempt from the provisions of the California Environmental Quality Act (Public Resources Code,

Section 21000, et seq.), in accordance with Section 15308 and 15330, Title 14, California Code of Regulations (CCR).

24. This discharge is exempt from the requirements of Consolidated Regulations for Treatment, Storage, Processing, or Disposal of Solid Waste, as set forth in Title 27, CCR, Section 20005, et seq., (hereafter Title 27), which allows a conditional exemption from some or all of the provisions of Title 27. The exemption pursuant to Section 20090(b), is based on the following:
- a. The Regional Water Board is issuing Waste Discharge Requirements,
 - b. The discharge complies with the Basin Plan, and
 - c. The wastewater does not need to be managed according to Title 22 CCR, Division 4.5, and Chapter 11, as a hazardous waste.

Section 20090(d) allows exemption for a project to clean up a condition of pollution that resulted from an unauthorized release of waste based on the following:

- d. The cleanup and abatement action is under the direction of a public agency,
 - e. Wastes removed from the immediate place of release will be discharged according to the Title 27 regulations, and
 - f. The remedial actions intended to contain wastes at the place of release shall implement the Title 27 regulations to the extent feasible.
25. The California Department of Water Resources sets standards for the construction and destruction of groundwater wells, as described in *California Well Standards Bulletin 74-90* (June 1991) and *Water Well Standards: State of California Bulletin 94-81* (December 1981). These standards, and any more stringent standards adopted by the Discharger or county pursuant to California Water Code Section 13801, apply to all monitoring wells.
26. Pursuant to California Water Code Section 13263(g), discharge is a privilege, not a right, and adoption of this Order does not create a vested right to continue the discharge.
27. All the above and the supplemental data and information and details in the attached Information Sheet, which is incorporated by reference herein, were considered in establishing the following conditions of discharge.
28. Alpha Explosives, Hercules Incorporated, and interested agencies and persons were notified of intent to prescribe Waste Discharge Requirements for this discharge and provided with an opportunity for a public hearing and an opportunity to submit written views and recommendations.
29. In a public meeting, all comments pertaining to the discharge were heard and considered.

IT IS HEREBY ORDERED that pursuant to Sections 13263 and 13267 of the California Water Code, Alpha Explosives, Hercules Incorporated, its agents, successors, and assigns, in order to meet the provisions contained in Division 7 of the California Water Code and regulations adopted hereunder, shall comply with the following while conducting the above-described groundwater remediation project.

[Note: Other prohibitions, conditions, definitions, and some methods of determining compliance are contained in the attached "Standard Provisions and Reporting Requirements for Waste Discharge Requirements" dated 1 March 1991, incorporated herein.]

A. Discharge Prohibitions

1. Discharge of wastes to surface waters or surface water drainage is prohibited.
2. Discharge of waste classified as 'hazardous' under Section 2521 of Title 23, CCR, or as 'designated' under Section 13173 of California Water Code, is prohibited.
3. Discharge of acetate, phosphate, and groundwater diluent at locations or in a manner different from that described in Finding No. 10 is prohibited.
4. Neither the treatment nor the discharge shall cause a nuisance or condition of pollution as defined by the California Water Code, Section 13050.
5. Implementation of Phase II and Phase III is prohibited until the Work Plans required in Provision D.2.e. have been submitted to and concurred with by Regional Water Board staff.

B. Discharge Specifications

1. No waste constituent shall be released or discharged, or placed where it will be released or discharged, in a concentration or in a mass that causes violation of the Groundwater Limitations.
2. Acetate may be injected into groundwater at a ratio of up to 4 grams per gram of nitrate-nitrogen and 2 grams per gram of perchlorate at concentrations up to 30,000 mg/l of total organic carbon (TOC) in general accordance with phased locations as shown on Attachments B and C.
3. After initial Phase I injections of acetate, subsequent injections of acetate and phosphate of up to 4 grams of acetate per gram of nitrate-nitrogen and 2 grams of acetate per gram of perchlorate at concentrations up to 30,000 mg/l of total organic carbon are permitted under the following conditions:
 - a. Total organic carbon is below 100 mg/l at the injection location.

- b. A supplemental injection proposal is submitted to and concurred with by Regional Water Board staff.

C. Groundwater Limitations

1. The Discharger shall not cause the groundwater at downgradient monitoring well MW-9 to exceed 10 mg/l of total organic carbon or the pre-injection concentration of total organic carbon, whichever is greater.
2. The Discharger shall not cause the groundwater beyond the treatment zone to contain taste- and odor-producing substances in concentrations that cause nuisance or adversely affect beneficial uses.
3. The Discharger shall not cause the groundwater beyond 100 feet from an injection grid to contain concentrations of chemical constituents, including the amendments and by-products of the in situ treatment process, in amounts that adversely affect municipal, domestic, industrial or agricultural uses.
4. The discharge shall not cause pollution or nuisance as defined by the California Water Code, Section 13050.

D. Provisions

1. Alpha Explosives shall notify Regional Board staff a minimum of **one week** prior to any injections of acetate.
2. All of the following reports shall be submitted pursuant to Section 13267 of the California Water Code. All technical reports required herein that involve planning, investigation, evaluation, or design, or other work requiring interpretation and proper application of engineering or geologic sciences, shall be prepared by or under the direction of persons registered to practice in California pursuant to California Business and Professions Code sections 6735, 7835, and 7835.1. To demonstrate compliance with sections 415 and 3065 of Title 16, CCR, all technical reports must contain a statement of the qualifications of the responsible registered professional(s). As required by these laws, completed technical reports must bear the signature(s) and seal(s) of the registered professional(s) in a manner such that all work can be clearly attributed to the professional responsible for the work.
 - a. Within **60 days** of initial injections of acetate in each Phase, Alpha Explosives and Hercules Incorporated shall submit an Implementation Report that shall include a description of field activities, remediation well installation, quantities, location, and method of acetate injection, a table of groundwater elevations, and a table of pre-injection baseline concentrations of nitrate-nitrogen, ammonia/ammonium, perchlorate, total organic carbon, and alkalinity.

- b. **Within 8 months** of initially injecting acetate in Phase I, and prior to any additional Phase I acetate injection, the Alpha Explosives and Hercules Incorporated shall submit a Phase I progress report that shall include groundwater surface elevation measurements and remediation monitoring data from Phase I and PowerProbe injection monitoring locations, results achieved, and recommendations.
 - c. Within **16 months** of initially introducing acetate for Phase I, Alpha Explosives and Hercules Incorporated shall submit a Phase I Annual Progress Report that shall include groundwater remediation monitoring data, a record of and discussion of the carbon quantities introduced, results achieved, extent of treatment zone, and recommendations. The Phase I Annual Progress Report may be submitted concurrently with the Annual Groundwater Monitoring Report that is due 1 December 2007 per Monitoring and Reporting Program No. R5-2005-0838.
 - d. Prior to supplemental injections of acetate, provide a brief work plan including current groundwater monitoring data for Regional Water Board staff review and concurrence.
 - e. Submit Phase II or Phase III implementation work plan to Regional Water Board staff for review and concurrence prior to commencing with Phase II or Phase III acetate injections.
3. If a groundwater sample from one or more monitoring wells located between 50 and 80 feet downgradient of the injection grids contains total organic carbon (TOC) greater than 50 mg/L then a confirmation sample shall be obtained between **30 and 45 days** of identifying the exceedance. Regional Water Board staff shall be notified by email when the confirmation sample results are known. If the exceedance is confirmed, then the following actions shall be taken:
- a. Within **60 days** of receiving confirmation results, Alpha Explosives and Hercules Incorporated shall provide a Contingency Plan to Regional Water Board staff for review and comment. The Contingency Plan shall propose a means to remove excess TOC from the area of exceedance. This Contingency Plan shall include a proposal to identify the extent of exceedance.
 - b. Within three months of receiving confirmation results, the well containing the exceedance shall be sampled for dissolved oxygen, perchlorate, TOC, and nitrogen. If TOC exceeds the reductive demand as measured by oxygen, nitrate, and perchlorate, then **within 60 days**, Alpha Explosives shall implement the approved Contingency Plan.
 - c. If TOC is less than the reductive demand then Alpha Explosives and Hercules Incorporated shall monitor this well for TOC for six consecutive months. If the 6-month average of TOC is greater than or equal to 50 mg/l, Alpha Explosives and Hercules Incorporated shall implement the approved Contingency Plan.

4. The Discharger shall comply with the attached MRP No. R5-2006-0110, which is part of this Order, and any revisions thereto as ordered by the Executive Officer.
5. These Waste Discharge Requirements may be rescinded either when total organic carbon is equal to or less than 50 mg/l and is less than the sum of the nitrate-nitrogen and perchlorate concentrations within the injection grids, or when total organic carbon is below 10 mg/l within the injection grids.
6. The Discharger shall comply with the "Standard Provisions and Reporting Requirements for Waste Discharge Requirements," dated 1 March 1991, which are attached hereto and by reference a part of this Order. This attachment and its individual paragraphs are commonly referenced as "Standard Provision(s)."
7. The Discharger shall comply with all conditions of this Order, including timely submittal of technical and monitoring reports as directed by the Executive Officer. Violations may result in enforcement action, including Regional Water Board or court order requiring corrective action or imposing civil monetary liability, or in revision or rescission of this Order.
8. The Discharger shall use the best practicable cost-effective control technique(s) currently available to comply with discharge limits specified in this Order.
9. The Discharger shall report any non-compliance, system shutdown, and/or accidental spill or release of liquid or material verbally to the Regional Water Board within 24 hours of the spill or release, and follow-up the verbal notification with written documentation of the spill or release within 14 calendar days of the incident. This documentation shall include the cause of the shutdown or release and the corrective action taken (or proposed to be taken).
10. Prior to any modifications at the Site that would result in material change in the quality or quantity of wastes treated or discharged, or any material change in the location of discharge, the Discharger shall report all pertinent information in writing to the Regional Water Board for review and approval. Waste Discharge Requirements may be revised prior to implementation of any modifications.
11. The Discharger shall maintain records of all monitoring information including all calibration and maintenance records, copies of all reports required by this Order, and records of all data used to complete the application for this Order. Records shall be maintained for a minimum of three years from the date of the sample, measurement, or report. This period may be extended during the course of any unresolved litigation regarding this discharge or when requested by the Executive Officer.

12. The Discharger shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) that are installed or used by the Discharger to achieve compliance with this Order. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems, which are to be installed by the Discharger when necessary to achieve compliance with the conditions of this Order.
13. While this Order is in effect, and prior to any change in ownership of the Site or management of this operation, the Discharger shall transmit a copy of this Order to the succeeding Owner/Operator, and forward a copy of the transmittal letter and proof of transmittal to the Regional Water Board. Transfer of privileges granted under this Order are subject to the discretion of the Executive Officer.
14. The Discharger shall allow the Regional Water Board, or an authorized representative, upon presentation of credentials and other documents as may be required by law, to:
 - a. Enter upon the premises regulated by the Regional Board, or the place where records must be kept under the conditions of this Order.
 - b. Have access to and copy, at reasonable times, any records that shall be kept under the conditions of this Order.
 - c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Order.
 - d. Sample or monitor, at reasonable times, for the purpose of assuring compliance with this Order or as otherwise authorized by the California Water Code, any substances or parameters at this Site.
15. A copy of this Order shall be kept at the discharge facility for reference by operating personnel. Key operating personnel shall be familiar with its contents.
16. The Regional Board will review this Order periodically and will revise requirements when necessary.

I, PAMELA C. CREEDON, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, Central Valley Region, on 22 September, 2006.

PAMELA C. CREEDON
Executive Officer

WASTE DISCHARGE REQUIREMENTS ORDER NO. R5-2006-0110
ALPHA DYNOL NOBEL AND HERCULES INCORPORATED
INSITU GROUNDWATER TREATMENT SYSTEM
PLACER COUNTY

-12-

Attachments

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

MONITORING AND REPORTING PROGRAM NO. R5-2006-0110

FOR

ALPHA DYNO NOBEL dba ALPHA EXPLOSIVES
AND HERCULES INCORPORATED

INSITU GROUNDWATER TREATMENT SYSTEM
PLACER COUNTY

This Monitoring and Reporting Program (MRP) incorporates requirements for monitoring the progress of the insitu groundwater treatment system. This MRP is issued pursuant to California Water Code Section 13267. Alpha Explosives and Hercules Incorporated (Discharger) is required to comply with this MRP. The Discharger shall not implement any changes to this MRP unless and until a revised MRP is issued by the Executive Officer. In addition to this MRP, groundwater sampling and reporting outlined in MRP No. R5-2005-0838 is still required.

All samples shall be representative of the volume and the nature of the discharge and matrix of the sampled medium. The time, date, and location of each grab sample shall be recorded on the sample chain of custody form.

PHASE I INSITU TREATMENT MONITORING

As shown on Figure 1, there are eight monitoring wells, six test wells, and one proposed monitoring well in proximity to the Phase I remediation area, and one downgradient monitoring well. Of these, eleven wells (TW-0, TW-1, TW-2, TW-3, TW-5, MW-2, MW-3, MW-6, MW-9, MW-17, and MW-18) are associated with remediation performance monitoring. The groundwater monitoring program for these eleven wells and any remediation performance monitoring wells installed subsequent to the issuance of this MRP for the purpose of Phase I monitoring shall follow the schedule below. These analyses shall be completed by a State certified laboratory and shall follow standard EPA protocol. The first sampling event shall occur prior to Phase I acetate injection. Groundwater samples from remediation performance monitoring wells shall be analyzed for the following constituents according to the schedule below:

A. LABORATORY MEASURED PARAMETERS

Constituents	Analytical Method	Practical Quantitation Limit ¹
Alkalinity	SM 2320B	10 mg/L
Ammonia/Ammonium	EPA 350.1	0.5 mg/L
Methane (dissolved)	RSK-175M	0.001 mg/L
Nitrate/Nitrite (as nitrogen)	EPA 353.2	0.1 mg/L
Perchlorate	EPA 300.0	4.0 ug/L
Total Organic Carbon	EPA 415.1	1 mg/L

¹ For non-detectable results

B. MONITORING FREQUENCY

All constituents listed in Section A shall be monitored in the following wells, except as noted below.

	Mix Building				Former Evaporation Pond						
	MW-2	MW-3	MW-17	MW-18	TW-0	TW-1	TW-2	TW-3	TW-5	MW-6	MW-9
Pre-Injection	X	X	X	X	X	X	X		X	X	X ¹
Two Weeks after Initial Injection					X		X		X	X	
Quarterly	X	X	X	X	X		X		X	X	
Annually, 1st quarter (Jan-March)						X		X ²			

¹ Total organic carbon is the only constituent required to be analyzed in this well.

² Methane is the only constituent required to be analyzed in this well.

C. FIELD MEASURED PARAMETERS

Monitoring of the enhanced bioremediation project shall include field measured parameters to be performed at each monitored well at each monitoring event. The field measured parameters to be recorded are listed in the following table.

<u>Constituents</u>	<u>Units</u>
Depth to Groundwater	0.01 ft
Electrical conductivity	µmhos/cm
pH	pH units
Oxidation-reduction potential	millivolts
Temperature	°F/°C
Groundwater elevation	Feet and hundredths, mean sea level

Field testing instruments (such as those used to test oxidation-reduction potential and pH) may be used provided that:

1. The operator is trained in proper use and maintenance of the instruments.
2. The instruments are field calibrated prior to each monitoring event.
3. Instruments are serviced and/or calibrated by the manufacturer at the recommended frequency.
4. Field calibration reports are provided with the appropriate monitoring report.

REPORTING

In reporting monitoring data, the Discharger shall arrange the data in tabular form so that the date, sample type, and reported analytical result for each sample are readily discernible. The data shall be summarized in such a manner to clearly illustrate compliance with Waste Discharge Requirements and spatial or temporal trends, as applicable. The results of any monitoring done more frequently than required at the locations specified in the MRP shall also be reported to the Regional Board.

As required by the California Business and Professions Code Sections 6735, 7835, and 7835.1, all Groundwater Monitoring Reports shall be prepared under the direct supervision of a Registered Engineer or Geologist and signed by the registered professional.

A. Initial Monitoring Reports

Pre-injection baseline sampling data shall be submitted in an Implementation Report due within **60 days** after initial injections. Groundwater data obtained two weeks following the initial injections and pre-injection sample data shall be transmitted to Regional Water Board staff electronically within **four weeks** of obtaining the samples.

B. Quarterly Data Submittals

Quarterly data tables shall be submitted to the Board by the **1st day of the second month following the end of each quarter (i.e., the October-December transmittal is due by 1 February)**. The data tables may be transmitted electronically, and should include cumulative data.

C. Semi-Annual Report

Semi-annual reports shall be submitted to the Board by **1 June** and **1 December** of each year, commencing with **1 June 2007**. These reports shall contain an evaluation of the effectiveness and progress of the remediation, and may be submitted in lieu of the corresponding quarterly remediation data submittal. The content of the semi-annual report may be combined with the semi-annual report required by Monitoring and Reporting Program No. R5-2005-0838. Each semi-annual report shall contain the following minimum information:

1. Tabular summaries of all bioremediation data collected.
2. Graphical summaries of remedial progress, including nitrate, perchlorate, and total organic carbon concentration changes with time.
3. An evaluation of the performance of the enhanced bioremediation project and an analysis of the effectiveness in destroying the pollutants.

4. A discussion of compliance and the corrective action taken, if any, as well as any planned or proposed actions needed to bring the discharge into full compliance with the waste discharge requirements.
5. A discussion of any data gaps and potential deficiencies/redundancies in the monitoring system or reporting program.

A letter transmitting the monitoring reports shall accompany each report. Such a letter shall include a discussion of requirement violations found during the reporting period, and actions taken or planned for correcting noted violations, such as operation or facility modifications. If the Discharger has previously submitted a report describing corrective actions and/or a time schedule for implementing the corrective actions, reference to the previous correspondence will be satisfactory. The transmittal letter shall contain the penalty of perjury statement by the Discharger, or the Discharger's authorized agent, as described in the Standard Provisions General Reporting Requirements Section B.3.

The Discharger shall implement the above monitoring program as of the date of the Order.

Ordered by: _____
PAMELA C. CREEDON
Executive Officer

(Date)

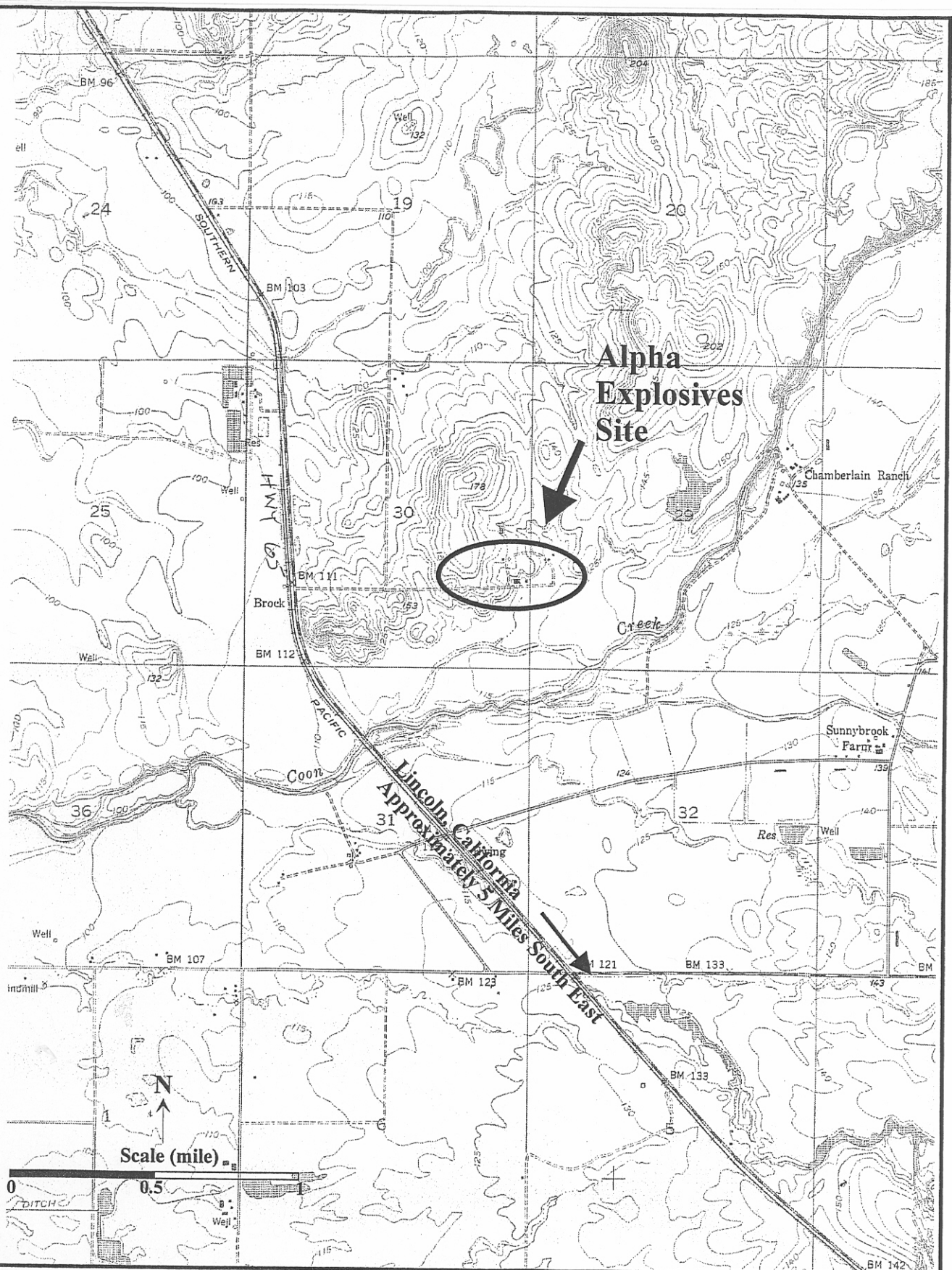
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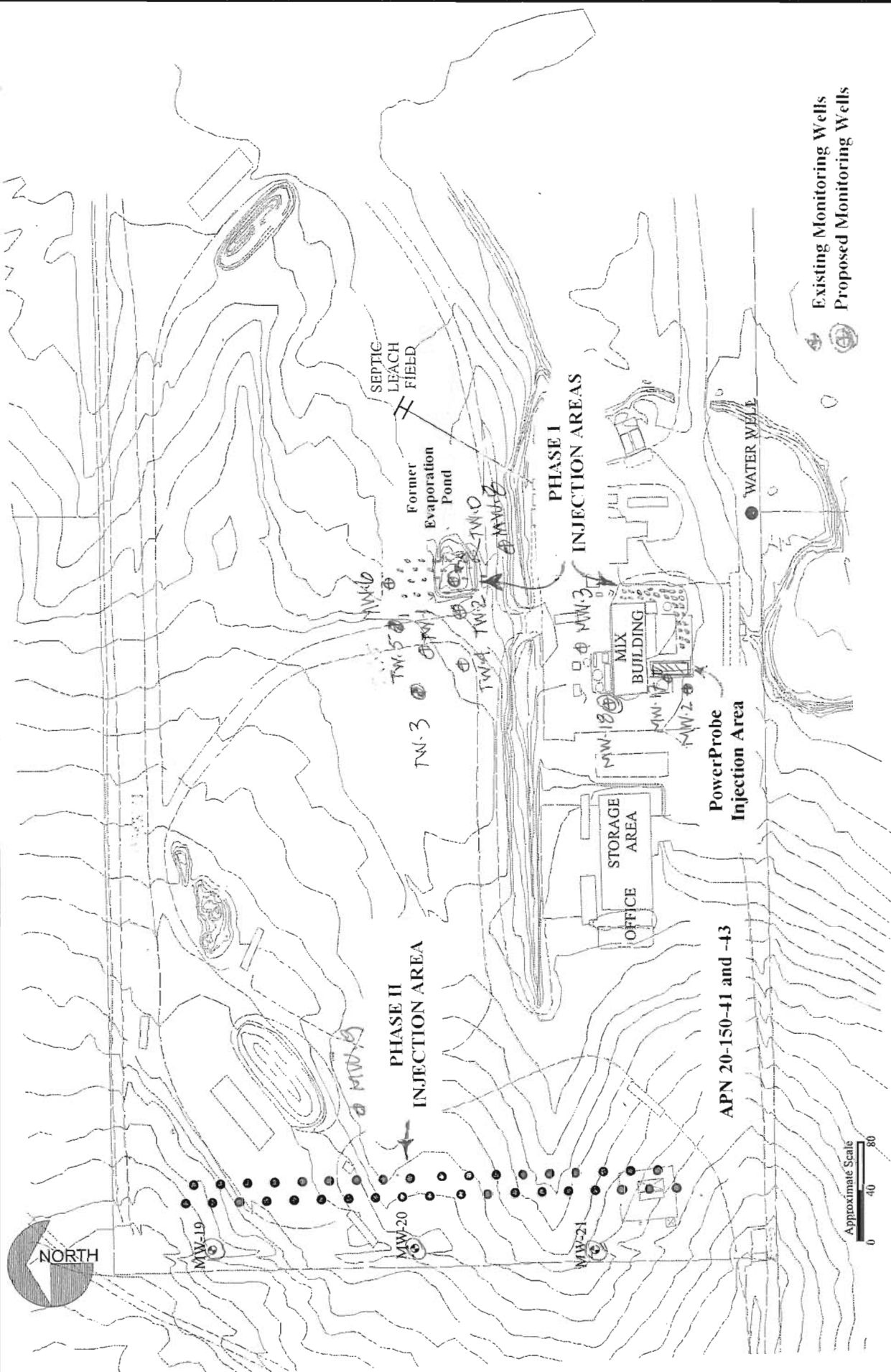
ALPHA EXPLOSIVES AND HERCULES INCORPORATED INSITU GROUNDWATER TREATMENT SYSTEM ORDER NO. R5-2006-0110 PLACER COUNTY

Perchlorate and nitrate are groundwater pollutants beneath the Alpha Explosives facility. Perchlorate pollution was a result of research and development of pourable perchlorate slurries, and nitrate pollution was a result of manufacture of ANFO, a mixture of ammonium nitrate and diesel fuel. Perchlorate appears to have entered groundwater from an evaporation pond where waste perchlorate slurries were disposed of. Nitrate originates around the ANFO manufacturing portion of the facility. Alpha Explosives and Hercules Incorporated have been experimenting with techniques to biodegrade perchlorate and nitrate insitu. Bench-scale studies and field-scale pilot studies have shown that acetate and ethanol are effective carbon sources to stimulate indigenous microbes to reduce perchlorate to chloride, reduce nitrate to dinitrogen gas, and oxidize acetate and ethanol to carbon dioxide and cell biomass.

The presence of perchlorate and nitrate in the groundwater poses a threat to existing and potential beneficial uses of the groundwater. Alpha Explosives and Hercules Incorporated propose to treat these pollutants insitu by injecting acetate, which would be permitted with these Waste Discharge Requirements. The pilot studies have shown that when the concentration of total organic carbon (an indirect measure of acetate and its breakdown products) is below 10 mg/l, it is rapidly consumed. When total organic carbon is greater than the sum of oxygen, perchlorate and nitrate, then fermentative conditions can develop, which slows the degradation process. If injected acetate is not completely consumed, these Waste Discharge Requirements require investigation into the extent of the treatment area, preparation of a Contingency Plan to remove excess total organic carbon, and if necessary, implementation of the Contingency Plan. These Waste Discharge Requirements also require monitoring and reporting to measure the effectiveness and extent of the treatment area.

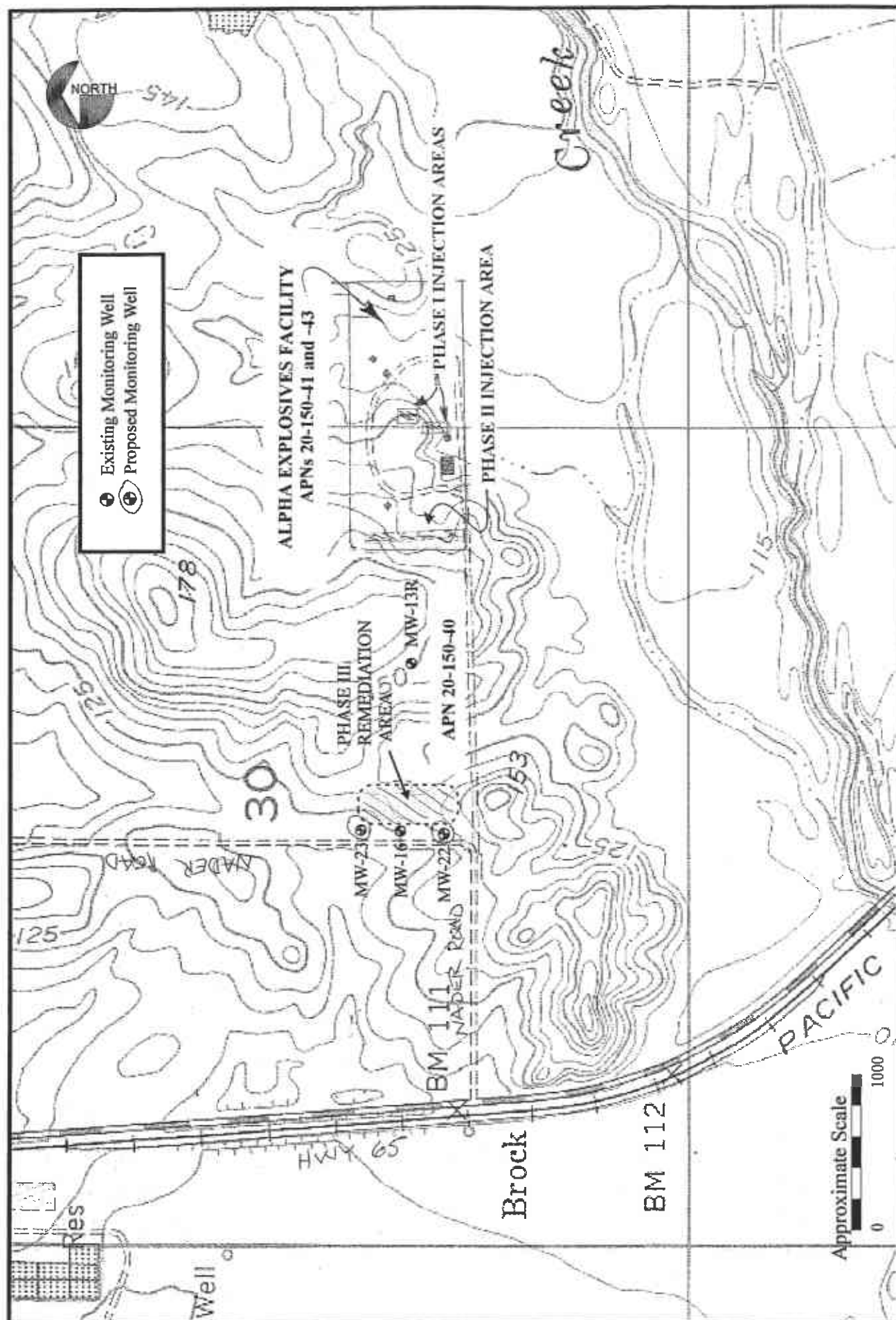
AST





FIGURE

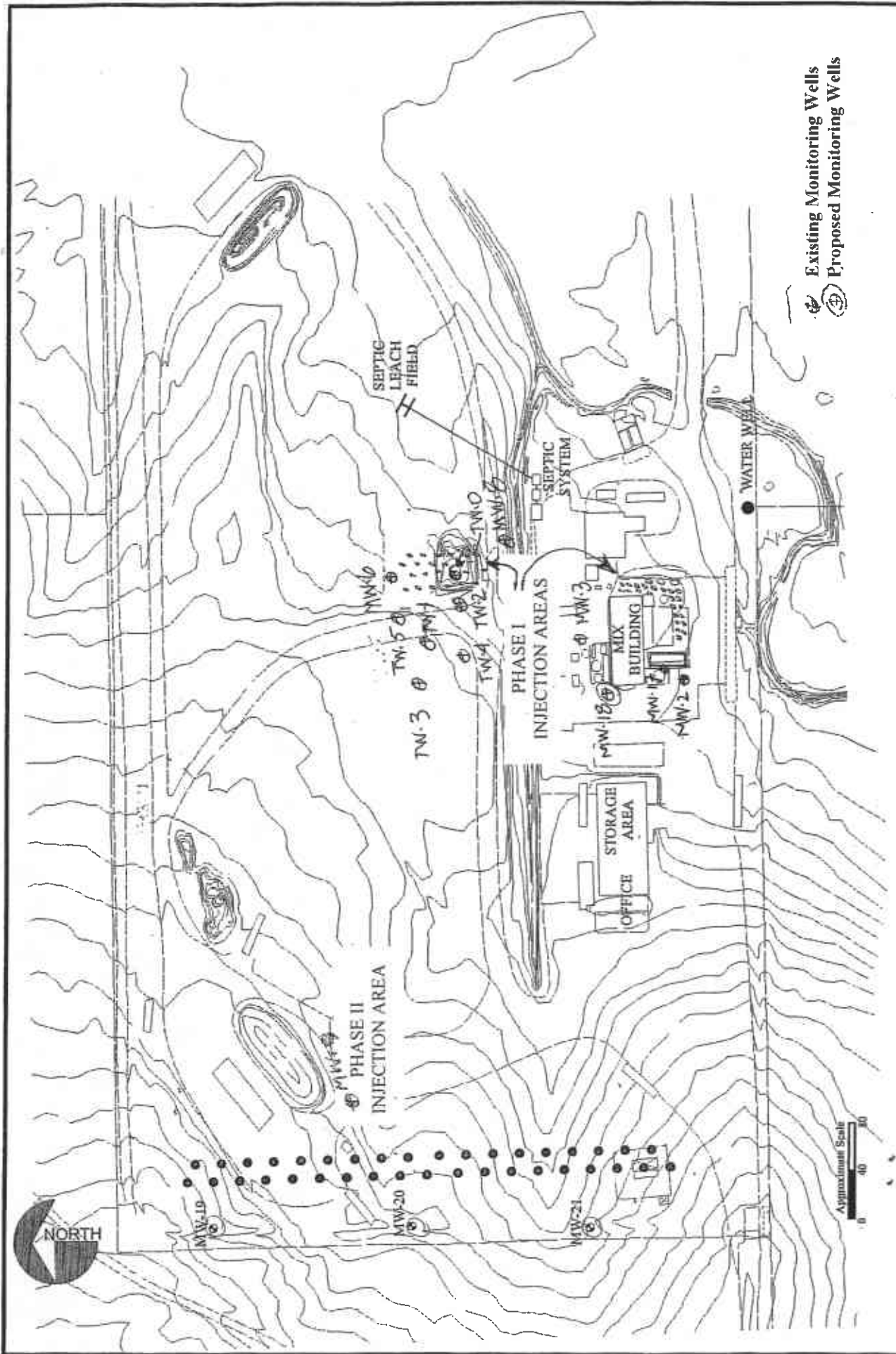
PHASE I AND PHASE II REMEDIATION AREAS



FIGURE

PHASE III REMEDIATION AREA

Hydrometrics, Inc.
Consulting Scientists and Engineers



FIGURE

PHASE I MONITORING WELL LOCATIONS

Hydrometrics, Inc.
Consulting Scientists and Engineers